SWRU341A
November 2013

CC2541 Advanced Remote Control Quick Start Guide

Opening the Box and Evaluating *Bluetooth*® low energy

Kit Contents

1 x Advanced Remote with batteries
1 x CC2540 USB Dongle
1 x CC Debugger with cables
Documentation

The RF Boards in this kit are FCC and IC certified and tested to comply with ETSI/R&TTE over temperature from 0 to +35°C.

FCC/IC Regulatory Compliance
FCC Part 15 Class A Compliant
IC ICES-003 Class A Compliant

Caution! The kit contains ESD sensitive components. Handle with care to prevent permanent damage.

Introduction

This document will guide you through the initial steps required in order to run the pre programmed *Bluetooth*® low energy (BLE) demo application.

You will get familiar with the hardware in the box and how to interface the Advanced Remote with different platforms.

1. **Evaluate using USB dongle**. A USB dongle pre-programmed with firmware acting as translator between BLE HID (Human Interface Device) and USB HID is supplied in the kit and works with most operating system platforms*.

2. **Evaluate using Windows 8**. Windows 8 includes native support for the BLE HID (Human Interface Device) over GATT profile. Using a *Bluetooth*® Smart Ready dongle or internal *Bluetooth*® Smart Ready hardware you can easily connect the Advanced Remote to your computer.

* Tested on Windows, OSX and Ubuntu.

Hardware Setup

Pull down the white cover on the back of the Advanced Remote to access the battery holder. Insert 3xAAA (1.5V alkaline, non-rechargeable) batteries in the Advanced Remotes battery holder.

The Advanced Remote and CC2540 USB dongle come pre-programmed with their respective HID over GATT profile roles.

The Advanced Remote will work out of the box together with both the dongle and Windows 8 machines with Bluetooth 4.0 hardware.

When not bonded with a client, the Advanced Remote will advertise for 60 seconds with low duty cycle. If it is bonded, it will advertise for 5 seconds with a high duty cycle to send the button press quickly once reconnected.

When connected, the Advanced Remote will disconnect after 60 seconds to conserve power. Pressing a button will cause it to reconnect and transmit that button press.

Connect Using Single Mode BLE CC2540USB HID Dongle

1. Insert dongle in USB port

The dongle will be enumerated by a computer as several USB Human Interface Device class devices.

The dongle will translate received *Bluetooth*® low energy HID Service reports and transmit them to the computer through these virtual devices.

To remove any old bonding information, please press the red key (lower left corner) on the remote and SW1 on the dongle. The red LED on the dongle will be lit, indicating that it is idle. Pressing **SW2** will start scanning for **5 seconds**.

While scanning, the LED will blink red, indicating it's scanning for a *Bluetooth*® low energy peripheral which advertises HID service capabilities.

2. Advertise and connect

Press any number key or consumer control key like play or pause on the Advanced Remote to make the device advertise.

The devices will now connect and pair without PIN entry. The dongle LED should be lit green, and blink red whenever data is received from the Advanced Remote.

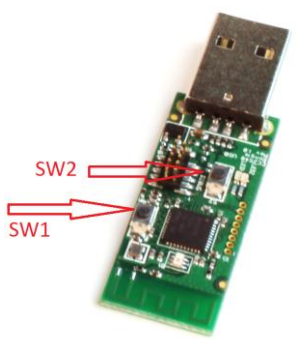
Long term bonding entries will be stored in both the Advanced Remote and the USB-dongle to speed up subsequent reconnections.

When bonded and disconnected, the dongle will blink green and always scan for its paired remote.

3. Manage connection and bonds

Pressing **SW2** on the dongle will disconnect any active connection between the dongle and an Advanced Remote.

Pressing **SW1** on the dongle when disconnected will erase all long term bond information stored on the dongle.

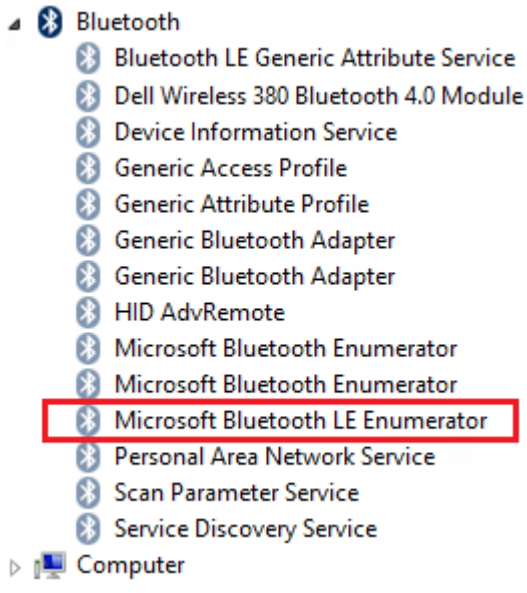


Pressing **SW1** button will not affect bond data stored on the Advanced Remote.

Connect to Windows 8 with *Bluetooth*® 4.0 LE *(Smart Ready)* hardware

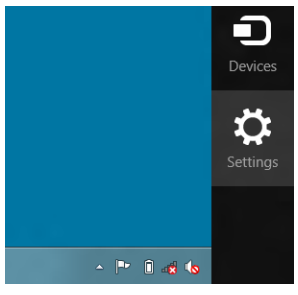
1. Make sure BLE works

In Device manager, under "Bluetooth", make sure that you see references to "Bluetooth LE".

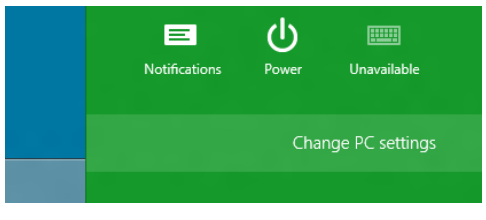


2. Open PC settings

On the PC, move your mouse pointer to the lower right hand corner and click on "Settings".

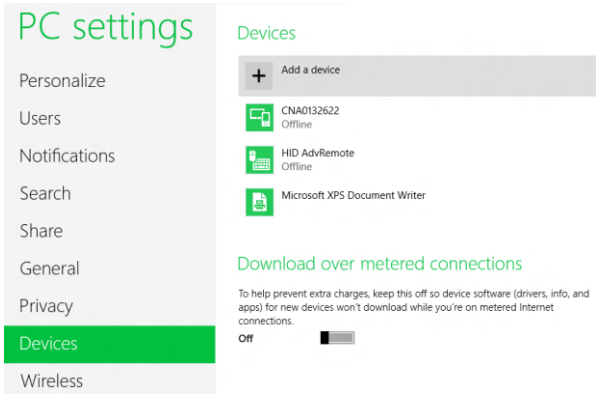


Then click on "Change PC settings".



3. Add Advanced Remote

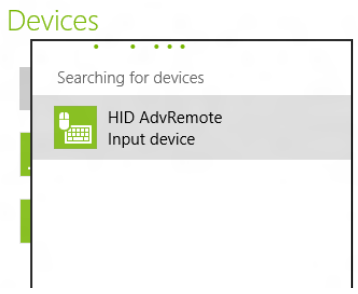
Then click on "Devices" and "Add a device".



Web sites: www.ti.com/ble
E2E Forum: www.ti.com/ble-forum

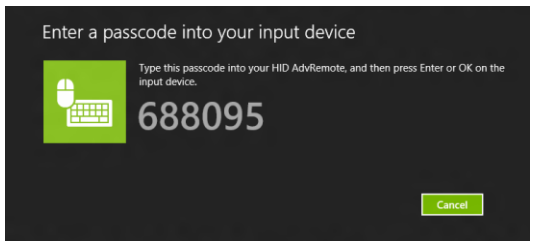
4. Add “HID AdvRemote”

To remove any old bonding information, please press the red key (lower left corner) on the remote. If you have pressed a button on the Advanced Remote, and it’s not connected to another host, it will show up in the list of found devices.



5. Enter pairing code

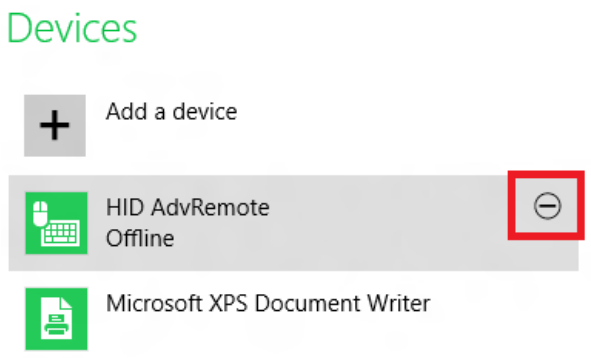
The devices will now pair using Passkey entry. On your Advanced Remote, enter the 6-digit passkey displayed on the computer screen.



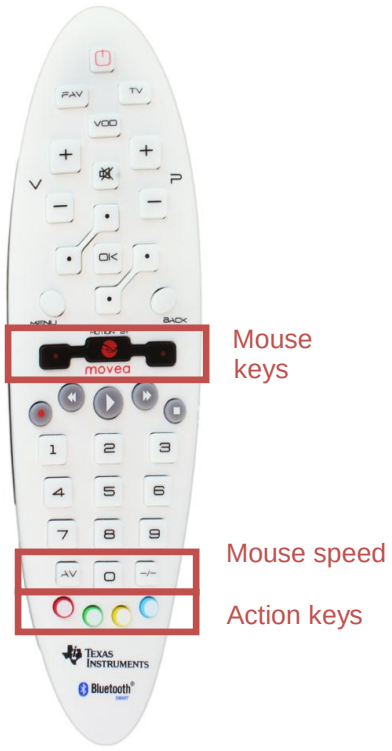
The Advanced Remote is now paired with Windows and bond data is stored on both devices, making reconnection faster and passkey entry unnecessary.

6. Remove device

A device can be removed from Windows and bond data deleted by clicking on the device and then the (–) symbol.



Using the Advanced Remote Control



1. Advertise and connect

Almost all the keys will make the Advanced Remote start advertising and be discoverable by hosts scanning for HID capable BLE devices.

2. Keyboard input

Pressing any number will act as a keyboard input of that number. The same goes for **OK** which is *Enter*, **Back** which is *Backspace* and the four keys surrounding **OK**, which act as directional or arrow keys.

3. Consumer control

Buttons such as Volume, Mute, Play, Pause etc. are consumer control keys, and will control media settings on your computer.

4. Mouse input

Holding down the middle mouse button will prompt the Advanced Remote to interpret your movement of the remote as mouse input and send this to the computer.

Double clicking the middle button will lock the mouse function. The left and right buttons act as left and right mouse buttons.

Pressing **AV** and **–/–** will decrease and increase mouse speed.

5. Remove bond information

Pressing the Red action key (leftmost) will remove bonding information stored on the Advanced Remote. Pairing will have to be done again, using passkey entry if applicable. The peer device is not notified of this un-pairing.

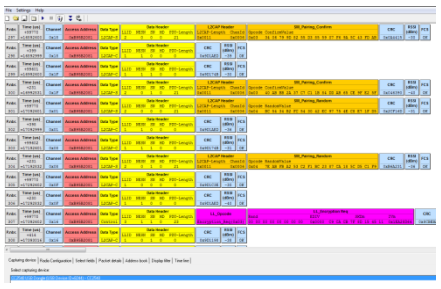
6. Calibrate

Pressing the Blue action key (rightmost) will recalibrate the onboard motion sensors. The mouse function must be off and the device must lie on a flat surface when doing this. If the Advanced Remote is not ready for calibration, a high pitched note will sound. Just press the blue key again. During calibration a low-pitched tick will sound for 12 seconds. A high-pitched note at the end indicates success.

Additional Tools and Links

BLE Packet Sniffer

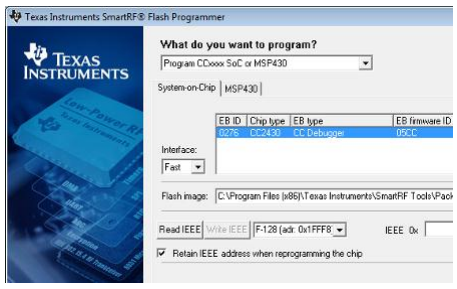
The CC2540 USB Dongle can be used as a BLE sniffer and monitor packets sent over the air.



The SmartRF Protocol Packet Sniffer software can be downloaded from our website at http://www.ti.com/tool/packet-sniffer.

SmartRF Flash Programmer

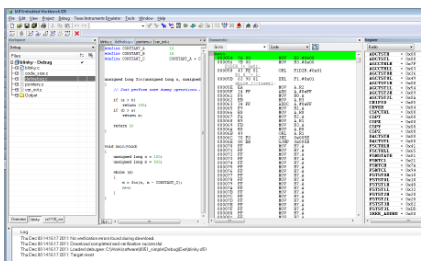
Texas Instruments has a simple tool which can be used to program the flash on the CC2541.



SmartRF Flash Programmer can be downloaded at www.ti.com/tool/flash-programmer.

IAR Embedded Workbench

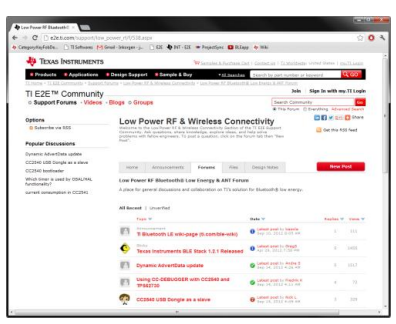
To develop software, program, and debug the CC2541, you should use IAR Embedded Workbench for 8051.



More information on IAR EW8051, including a free evaluation version download, can be found at www.iar.com/ew8051.

BLE E2E Forum

For additional help, visit the TI Bluetooth low energy E2E forum, www.ti.com/ble-forum, for instant support during your development.



BLE Wiki

Our BLE Wiki contains application examples, guides and documentation covering those extra steps you might need help with. The Wiki is not only managed by Texas Instruments employees but also E2E community members. Anyone can share, edit and make use of the information posted here.

The Wiki is found at www.ti.com/ble-wiki.

! For optimal performance and the latest bug-fixes, download the newest software stack version at ti.com/ble-stack.

Useful Links

TI BLE Advanced Remote User Guide
www.ti.com/lit/swru343

TI BLE Stack and Software:
www.ti.com/ble-stack

CC2540/41 BLE Software Developer’s Guide:
www.ti.com/lit/swru271

CC2540/41 User’s Guide:
www.ti.com/lit/swru191

CC2541 Product Page:
www.ti.com/cc2541

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For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Concerning EVMs including radio transmitters

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

Concernant les EVMs avec appareils radio

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or
3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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http://www.tij.co.jp

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In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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